Acupuncture effect on gastric myoelectric activity: experimental protocol

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Abstract
Objective: In Chinese literature many studies report an improvement of gastrointestinal motility and symptoms with acupuncture. It is known that myoelectric activity of the stomach is related to gastric motility (GM). The aim of this study was to investigate the acupuncture effect on gastric myoelectric activity (GMA) in healthy humans, with point G2 painful. Methodology: it was a prospective study in parallel group design (n=6). "Leopard spot" technique was the acupuncture technique used. Gastric myoelectric activity was recorded using EGG. Maximum tolerable permission on G2, measured using the algometer. Results: With specific acupuncture, the Dominant Power (DP) of EGG increases and reduces the pain, on G2 point, in algometry and visual analogue scale (VAS). Conclusions: Specific acupuncture seems to have effect GMA and seems to increase gastric motility and reduce the pain.

Keywords: gastrointestinal motility; acupuncture, myoelectric activity

Introduction
Functional gastrointestinal symptoms are common in the general population, with a prevalence of 25% to 40% and motivate much of primary care consultations (1,2). Several studies have demonstrated an association between abnormalities in the gastric myoelectric activity with gastric motility disorders and gastrointestinal symptoms (3-10). The GMA can be measured cutaneously. The electrogastrography (EGG) is a non invasive technique, discovered in 1921 and popularized in 1990, which records the GMA through electrodes placed on the abdominal surface and allows the normal and abnormal evaluation of GMA (gastric dysrhythmias) (11-13). The EGG is an attractive technique because it is non invasive and is a method of high simplicity, compared to other diagnostic techniques. During the last decades, numerous studies have been conducted to investigate the effect and mechanism of acupuncture in gastrointestinal motility (GI) and in patients with disorders Functional Gastrointestinal (DFGs) (2,14-34). It is known that acupuncture has been used for over a thousand years in China to treat symptoms GIs. Its effectiveness in DFGs in patients has been proven once led to changes in acid secretion, gastric motility and visceral pain (29-34). In fact, the present study aims to evaluate the effect of acupuncture on GMA, using the Electrogastrography technique before and after treatment with acupuncture. This is an experimental, prospective
study in healthy subjects, but positive palpation in the G2 point (corresponding to the pylorus region) that aims to evaluate whether acupuncture is effective in GMA.

Material and Methods

Study Design - This was a preliminary, prospective study, in parallel group design (n=6). The study was conducted under the rules of the Declaration of Helsinki, and approval was received from the Ethics Committee of ICBAS-UP. All participants were provided written informed consent before their participation.

Recruitment - The sample included 6 healthy humans, of both sexes with G2 painful point. Two groups were established: Group A - undergoing specific acupuncture and Group B - subject to non-specific acupuncture. For inclusion, participants have to be between 18 and 65 years, acupuncture diagnosis: G2 Syndrome. For exclusion, other gastrointestinal disease diagnosed, diabetics, pregnant and breast-feeding period and people afraid of needles.

Intervention Protocol - All participants were fasted for 5 hours before the evaluations. The evaluations were conducted in a controlled environment in terms of temperature (25 °C) and sound. The baseline evaluation was performed with the patient in supine position in which it is verified G2 point (diagnostic point of Traditional Chinese Medicine – Heidelberg Model), algometry, VAS and held the EGG lasting 30 minutes. Then proceeded to the therapeutic intervention with acupuncture corresponding to the group to which the volunteer belonged. Ending these intervention participants rested 3 minutes and was subsequently re-evaluated as the same parameters. Leopard Spot technique was the acupuncture technique used. In Group A, specific acupuncture points were selected according to the acupuncture diagnosis G2 Syndrome (bloodletting on Rs 10, S25, S44). In Group B, non-specific acupoints to the G2 Syndrome (bloodletting on Rs15, V66, Extra point - 5 cm lateral to that navel left side).

Outcome Assessment - The outcome measures of the study included (i) gastric myoelectric activity (ii) maximum tolerable permission on G2 (iii) visual analogue scale. Values were collected before and after treatment.

For evaluate the gastric myoelectric activity we use electrogastrography for recording of GMA using cutaneous electrodes placed on the abdominal skin over the stomach (13). Before the placement the electrodes, the abdominal skin of cleaned, the hair, if present, was shaved. Three EGG electrodes were placed, one over the antrum, the other over the corpus and the third electrode, placed on the left costal margin, was used as a reference. The participants was in supine position, and was asked not to talk and to remain as still as possible during the recording to avoid motion artifacts. The EGG recording was made for 30 min, after a fast of 5 h, in a quiet environment. Studies have shown that the cutaneous EGG is an accurate measurement of the gastric slow waves (5,12). The gastric electrical activity consists of slow waves and spike potentials (11,12). The frequency of gastric slow waves determines the rate of gastric contractions.

The contraction related spike potentials and electrical control activity are reflected in the EGG as an increase in amplitude. The Dominant Frequency (DF) of EGG reflects the fundamental frequency of the gastric slow waves, expressed in cycles per minute and the Dominant Power (DP) is the power at the dominant frequency in the power spectrum of EGG, associated with amplitude and the regularity of gastric slow waves. The relative change of EGG Dominant Power has been shown to be associated with gastric contractility (35). The maximum tolerable permission on G2 is assessed by algometry, a device which measures and record sensitivity levels, by measurement of the pressure pain threshold.

In collaboration with FEUP and responsibility of Professor Joaquim Gabriel and Engineer Rui Correia was created for this study a prototype with the intention of measuring the force applied at a point of contact.

Results

The Dominant Power of EGG, with specific acupuncture seems to increase and diminished with nonspecific acupuncture B (fig. 1).

![Fig. 1 - Variation in Dominant Power of EGG between groups](image-url)

![Fig. 2 - Improvement in algometry (increased pressure Kg)](image-url)
The acupuncture seems to have an effect on Gas

**Conclusions**

Long-term effects also would indicate relaxation of the pyloric tone. This fact can normalize and promote gastric emptying (18,22) and increasing the percentage of gastric slow waves (19,20).

The results of this experimental study, seems to show that the EGG Dominant power (parameter associated with the extent and regularity of gastric slow waves) increases with the specific acupuncture and decreased with non-specific acupuncture. It also, seems demonstrated an improvement in pain Algometry and VAS in group A. In group B shows no significant differences in Algometry and VAS. In view of these results, the specific acupuncture seems to be effective in all primary parameters and non-specific acupuncture is not, which represents the points used in group A has a higher specificity on gastric motility, increasing gastric contractility and decrease pain pyloric, presumably indicating relaxation of the pyloric tone. This fact can normalize and promote gastric emptying function. And if so, empirically explain the beneficial effect of specific acupuncture in functional dyspepsia. Several studies have been conducted to investigate the therapeutic potential of acupuncture in functional dyspepsia (17-23). This study seems to show similar results to other studies in which different acupuncture points on the body have different effects on the GMA (36,37).

**Further Studies** - This way it will be interesting to do further research where there is a larger sample, sample homogeneity on functional gastrointestinal disorders and quality analysis of Gastric Myoelectric Activity of EGG (percentage of time with normogastria and dysrhythmia). A double-blind control study and contemplate long-term effects also would enrich a future work.

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**References**


